*luteipes, 46.
*maculiventris, 34.
maindroni, 49.
*marginata, 31.
melanocephala, 39.
melanura, *Kollar & Redt.*, 41.
*nilgirica, 26.
*nitida, 50.
pallidicolor, 60.
*plectrophora, 1.
*rostrifera, 48.
rouyeri, 23.
*semitecta, 38.
terminata, 3.
*triserrata, 16.
*uncigera, 29.
*ungulata, 12.
*varicornis, 54.
*varipes, 56.
*virescens, 15.
viridescens, 19.
viridipennis, 17.
*viridivittata, 33.

Synonyms and Varieties.

brevicornis (Prionocerus), 1.
cærnleatus, 18.
cardoni, 44.
ceylonica, 39.
diversipennis, 25.
forticornis (Prionocerus), 1.
fuscipennis (Prionocerus), 1.
melanura, *Muls. & Bourg.*, 40.
metallescens, 19.
notaticollis (Prionocerus), 2.
tripartita, 2.

EXPLANATION OF PLATES XI. & XII.

Figs. 1-49. Profile views of the ♂ genital armature of species of *Prionocerus* and *Idgia*, one only of the lateral lobes shown and the free tubular median lobe lowered from its normal position, so that a clearer outline could be given of it, the apical portion of the sac (when visible in the dried specimens) added; 9 *a* and 10 *a*, dorsal views of 9 and 10, the median lobe omitted in 9 *a*; 49 *a*, sixth ventral segment of *I. pallidicolor*, ♂; 50, apices of elytra of *I. uncigera*, ♀; all × 12. In fig. 46 the median lobe is out of its normal position, and shown from the ventral aspect.

XXXIV.—*A Note on the Egg-burster of Eucephalous Fly-larvæ.* By F. W. Edwards.

In widely separated divisions of the animal kingdom special embryonic organs are found whose function is to facilitate the hatching of the embryo from the egg. Everyone is familiar with the hard knob which occurs on the tip of the upper jaw in the chick as well as in other oviparous vertebrates. Among the Insecta egg-bursting organs are often found on the dorsal surface of the head, and assume a variety of forms. Different types have been described by Packard ('Text-book of Entomology,' p. 585), Berlese ('Gli Insetti,' vol. 2, p. 218), and Williams and Buxton (Trans. Ent. Soc. London, 1916, p. 88). In other cases these organs appear to be part of the amnion rather than of the embryo itself; instances of this are given by Riley (*vide* Packard, Text-book, p. 585) and Kershaw (Bull. Trinidad Dept. Agric. xii. 1913, p. 94).

In regard to the Diptera, I have only succeeded in tracing two published references to an egg-burster, both relating to the Culicidæ. Howard, Dyar, and Knab, in their 'Mosquitoes of North and Central America and the West Indies,' say (vol. i. p. 97):—

"The first-stage larva may be recognized by the presence on the head of the egg-burster. This is situated dorsally on the middle of the head and consists of an oval, pale, depressed area, in the middle of which is situated a chitinous disc surmounted by a small black chitinous peg."

Scott Macfie (Bull. Ent. Res. vii. 1917, p. 298) says in regard to *Stegomyia fasciata*: "The 'egg-burster,' situated dorsally about the middle of the head, is a conspicuous feature in the first phase"; he also gives a figure which shows this organ, though not in any great detail.

In several Dipterous larvæ of different families which I have been able to examine, the egg-burster has a position and structure similar to that indicated by the above-mentioned authors for the Culicidæ. It is essentially the same in *Anopheles maculipennis*, *Aëdes argenteus* (= *Stegomyia fasciata*), *A.* (*Ochlerotatus*) *geniculatus*, *Theobaldia annulata*, *Chaoborus* (= *Corethra*) *plumicornis*, *Simulium angustipes*, *S. austeni*, *Chironomus dorsalis*, *Bolitophila pseudohybrida*, and *Trichonta* sp. In none of these cases does it resemble that of *Pulex canis*, described by Packard as "a thin vertical plate, like the edge of a knife."

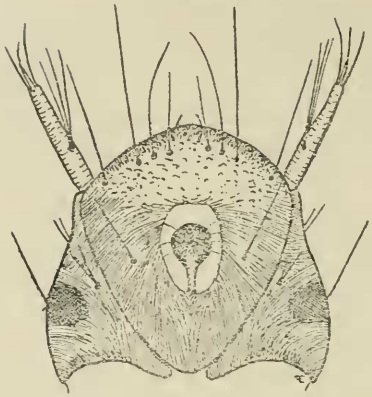
Though the list given above comprises all the species which I have observed, it is sufficiently comprehensive to warrant the belief that the egg-burster will be found to be present in a similar form in all the eucephalous larvæ of Nematocera, though it may not always be functional.

In every case all trace of the structure disappears after the first moult, though sometimes (at least in *Chironomus dorsalis* and *Aëdes geniculatus*), and perhaps always, a minute black pigment-spot is observable under the cuticle of the second-stage larva in the position occupied by the egg-burster in the first stage.

In an egg which is about to hatch, the young larva can be observed (provided the shell is thin enough) moving its head up and down and cutting or scratching a slit in the shell. I have observed this process in *Bolitophila pseudohybrida*, and in the newly-hatched larvæ of the same species have seen the egg-burster being raised and lowered. Presumably this latter movement also took place within the egg, though I was not able to observe it.

It would seem that the lowering of the egg-burster is

Fig. 1.



Aëdes geniculatus (Olivier).

Dorsal view of head of first-stage larva, to show position and form of egg-burster: from a living specimen. × about 60. (The shading is intended to represent fine ridges in the chitin, which occur over the greater part of the head.)

Fig. 2 *a*.

Fig. 2.

Fig. 2.—*Aëdes argenteus* (Poiret) [*Stegomyia fasciata* auct.]. Egg-burster, seen from posterior end of head, showing thickness of disc and strong central peg. × about 100.

Fig. 2 *a*.—The same, half side view. From cast skins; diagrammatic.

Fig. 3.

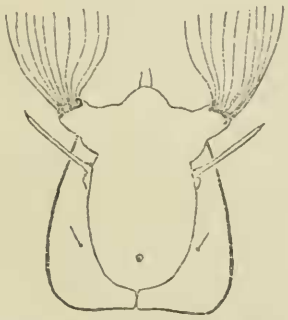
Theobaldia annulata (Schrank).

Sectional view (transverse) through egg-burster, showing attachment of muscles. × about 120. From a balsam mount in the British Museum, prepared by Mr. W. D. Lang.

effected by a pair of muscles which are attached to the inside of the disc and pass across to the ventral side of the head. These muscles are easily seen in the perfectly transparent larva of *Chaoborus* (*Corethra*) ; they are shown also in the accompanying diagram of the egg-burster of *Theobaldia annulata*. Though they almost meet on the chitinous disc, the muscles are wide apart at their ventral insertion. I have not ascertained whether they persist beyond the first larval stage. One must suppose that the egg-burster is raised and so brought into use by blood-pressure on the relaxation of this pair of muscles.

The precise form of the chitinous disc varies somewhat in the different species examined. It is relatively larger and more conspicuous in the Culicidæ than in the Chironomidæ and Mycetophilidæ, while among the Culicidæ it is

Fig. 4.



Simulium austeni, Edw.

Dorsal view of head of newly hatched larva, showing minute egg-burster near posterior end of clypeus. × about 60. From a spirit-specimen.

decidedly more heavily chitinised in *Aëdes* than it is in *Theobaldia* or *Anopheles*. In *Aëdes* it is connected by a narrow chitinous rod with the posterior part of the clypeus, the rod arising from a thickened bar in the chitin. I have not been able to detect this rod in other Culicidæ or in the other families examined. The eggs of *Aëdes* have usually great powers of resistance to dessication, and probably on this account have a thick chorion, which necessitates a more efficient egg-burster.

The two species of *Aëdes* examined show slight differences : the egg-burster in *A. argenteus* is nearer the posterior end

of the clypeus than it is in *A. geniculatus**, while in the latter species the chitinous disc bears a sharp transverse ridge on each side of the central peg.

In *Simulium austeni* the egg-burster is very small and inconspicuous, and appears to have no membranous area surrounding it, but this may not be the case throughout the genus. I hatched out in 1915 a number of young larvæ of *S. angustipes*, and, though these were not kept, my recollection of them is that they had egg-bursters as well developed as those of the Culicidæ. If this is so, it may be due to differences in breeding-habits between the two species.

The subject is one of considerable interest and will certainly bear further investigation.

XXXV.—*The Amphipod* Orchestia tucurauna, *Fritz Müller, of Brazil, redescribed from New Zealand Specimens.* By Chas. Chilton, M.A., D.Sc., LL.D., C.M.Z.S., Hon. Memb. Roy. Soc. N.S.W.

On July 11th, 1910, I collected near the mouth of the Waitohi stream at Picton, New Zealand, several specimens of a sand-hopper that I thought at the time would probably be *Orchestia chiliensis*, Milne-Edwards, which is common on the neighbouring shores of Queen Charlotte Sound and elsewhere on the New Zealand coasts. On examination, however, I found that, though two of the specimens were *O. chiliensis*, the others differed considerably from *O. chiliensis* in the shape of the second gnathopods of the male. One male specimen of these was dissected and mounted and to some extent examined, and was provisionally named *O. redmani*, sp. n., in my MS. in honour of Dr. Redman of Picton, to whom I am indebted for much assistance. I felt sure that I had seen somewhere a drawing of a gnathopod similar to the second gnathopod of this specimen, but at the time could not ascertain where this was ; consequently the specimens were laid aside for a more favourable opportunity. Recently, in looking up Stebbing's paper in the Trans. Linn. Soc. vol. vii. p. 395, 1909, for another purpose, my attention was drawn to his figures of *O. sulensoni* (pl. xxx. C), owing to the

* This character would appear to be variable, since the egg-burster is shown nearer the middle of the head in Scott-Macfie's figure than it appeared to be in the cast skins of the same species which I examined.